KAMAYA OHM

Spec. No.: RLP-K-HTS-0001 /11

Date: 2017. 1. 10

Specification

Title: METAL-PLATE CHIP RESISTOR; LOW OHM

Style: RLP16,20,32,63, MLP20,32,63

RoHS COMPLIANCE ITEM
Halogen and Antimony Free

Product specification contained in this specification are subject to change at any time without notice If you have any questions or a Purchasing Specification for any quality Agreement is necessary, please contact our sales staff.



Hokkaido Research Center Approval by: T. Sannomiya Drawing by: M. Shibuya

Note: Stock conditions

Temperature: $+5^{\circ}$ C ~ $+35^{\circ}$ C Relative humidity: 25% ~ 75%

The period of guarantee: Within 2 year from shipmen t by the company.

Solderability shall be satisfied.

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1. Scope

1.1 This specification covers the detail requirements for metal-plate chip resistor; low ohm, style of RLP16, 20, 32, 63, MLP20,32, 63.

1.2 Applicable documents

JIS C 5201-1: 2011, JIS C 5201-8: 2014, JIS C 5201-8-1: 2014 IEC60115-1: 2008, IEC60115-8: 2009, IEC60115-8-1: 2014

2. Classification

Type designation shall be the following form.

(Example)

1 Metal - plate chip resistor; low ohm

2 Size

RLP16	1608 size, 0.33W
RLP20	2012 size, 0.5W
RLP32	3216 size, 1W
RLP63	6332 size, 1W
MLP20	2012 size, 1W
MLP32	3216 size, 1.5W
MLP63	6332 size, 2W

3 Temperature coefficient of resistance

N	±70×10 ⁻⁶ /°C
K	±100×10 ⁻⁶ /°C
-(Dash)	±150×10 ⁻⁶ / °C

4 Rated resistance

1L50	1.5mΩ
R002	2mΩ

5 Tolerance on rated resistance

	F	±1%
	J	±5%

6 Packaging form

TP	Paper taping
TE	Embossed taping



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3. Rating

3.1 The ratings shall be in accordance with Table-1.

3.1.1 RLP series

Table-1(1)

Style	Rated dissipation	Rated current	Temperature	coefficient of	Rated resistance	Tolerance on rated		
Otylo	(W)	(A)	resistance (10 ⁻⁶ / °C)		$(m\Omega)$	resistance		
		8.1	K	100	5			
RLP16	0.33	0.1	N	±70	3			
KLFIO	0.55	5.7	K	100	10			
		5.7	N	±70	10			
		15.8	K	100	2			
		15.6	N	±70	2			
		10.0	K	100	2			
		12.9	N	±70	3	F(±1%) J(±5%)		
		11.1	K	100	4			
			N	±70				
		10.0	K	100	5			
			N	±70				
RLP20	0.5 9.1 8.4	K	100	6				
1 (2, 20		9.1	N	±70	U			
				0.4	K	100	7	
		8.4	N	±70	/			
		7.0	K	100	0			
		7.9	N	±70	8			
		7.4	K	100	9			
			N	±70				
		7.0	K	100	10			
		7.0	N	±70	10			

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Table-1(2)

	1 5	1 5	Table		D	1
Style	Rated dissipation	Rated current	Temperature	coefficient of	Rated resistance	Tolerance on rated
<u> </u>	(W)	(A)	resistance	r'	$(m\Omega)$	resistance
		31.6	-(Standard)	±150	1	
		01.0	K	±100	'	
		22.3	K	±100	2	
	22.3	N	±70	2		
		18.2	K	±100	3	
		10.2	N	±70	3	
		15.8	K	±100	4	
		15.0	N	±70	4	
		14.1	K	±100	5	
		14.1	N	±70	5	
		12.9	K	±100	6	F(±1%) J(±5%)
			N	±70		
		11.9	K	±100	7	
RLP32			N	±70	7	
	1.0	0 11.1	K	±100	8	
KLF32	1.0		N	±70		
		10.5	K	±100	9	
			N	±70	9	
		40	K	±100	10	
		10	N	±70		
		0.5	K	±100	11	
		9.5	N	±70		
		0.4	K	±100	12	
		9.1	N	±70		
			K	±100	13	
		8.7	N	±70		
		0.4	K	±100	4.4	1
		8.4	N	±70	14	
		0.4	K	±100	45	1
		8.1	N	±70	15	

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Table-1(3)

Style	Rated dissipation (W) 2.0	Rated current (A) 44.7 22.3 18.2	Temperature resistance -(Standard) K N K N K N K	(10 ⁻⁶ / °C) ±150 ±100 ±70 ±100 ±70	Rated resistance (mΩ) 1	Tolerance on rated resistance	
Ciyic	, ,	44.7	-(Standard) K N K N K N	±150 ±100 ±70 ±100 ±70	1	resistance	
	2.0	22.3	K N K N K	±100 ±70 ±100 ±70			
_	2.0	22.3	N K N K	±70 ±100 ±70			
			K N K	±100 ±70	2		
			N K	±70	2		
			K		2		
		18.2					
		10.2		±100	3		
			N	±70	3		
		15.8	K	±100	4		
		0.01	N	±70	4		
		14.1	K	±100	5		
		14.1	N	±70			
		,	12.9	K	±100	6	1
		12.9	N	±70	0	F(±1%) J(±5%)	
		11.9	K	±100	7		
	1.0		N	±70	,		
RLP63		11.1	K	±100	8		
			N	±70			
		10.5	K	±100	9		
			N	±70			
		10	K	±100	10		
			N	±70			
		9.5	K	±100	44		
			N	±70	11		
		9.1	K	±100	10		
		9.1	N	±70	12		
		0.7	K	±100	12		
		8.7	N	±70	13		
			K	±100	1.1		
		8.4	N	±70	14		
		2.4	K	±100	15		
		8.1	N	±70	15		

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3.1.2 MLP series

Table-1(4)

Chilo	Rated dissipation	Rated current	resistance (10 ⁻⁶ / °C)		Rated resistance	Tolerance on rated																
Style	(W)	(A)			$(m\Omega)$	resistance																
		22.3	K	100	2																	
		22.5	N	±70	2																	
		18.2	K	100	3																	
		10.2	N	±70	3																	
		15.8	K	100	4																	
		13.0	N	±70	4																	
		14.1	K	100	5																	
		14.1	N	±70	3																	
MLP20	1.0	12.9	K	100	6	F(±1%)																
IVILI 20	1.0	12.9	N	±70	U	J(±5%)																
		11.9	K	100	7																	
		11.9	N	±70	<i>'</i>																	
		11.1	K	100	o																	
		11.1	N	±70	8																	
		10.5	K	100	9																	
		10.5	N	±70	9																	
		10	K	100	- 10																	
			N	±70																		
		38.7	-(Standard)	±150	1																	
			N	±70	ı																	
		27.3	K	±100	2																	
			N	±70	2																	
		22.3	K	±100	3																	
			N	±70																		
		19.3	K	±100	4																	
			N	±70																		
	1.5																	17.3	K	±100	5	
MLP32		17.5	N	±70	5	F(±1%)																
IVILI JZ	1.5	15.8	K	±100	6	J(±5%)																
		13.0	N	±70	U																	
		14.6	K	±100	7																	
		14.0	N	±70	7																	
		13.6	K	±100	Ω																	
		13.0	N	±70	8																	
		12.9	K	±100	9																	
		12.9	N	±70	9																	
		12.2	K	±100	10																	
		12.2	N	±70	10																	

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Table-1(5)

Style	Rated dissipation	Rated current	Temperature	coefficient of	Rated resistance	Tolerance on rated	
Style	(W)	(A)	resistance (10 ⁻⁶ / °C)		$(m\Omega)$	resistance	
		63.2	K	100	0.5	J(±5%)	
		00.2	Ν	±70	0.5		
		36.5	K	100	1.5		
		30.3	N	±70			
		31.6	K	100	2		
		31.0	N	±70	2		
		28.2	K	100	2.5		
		20.2	Ν	±70	2.5		
		25.8	K	100	3		
			Ν	±70	S		
		22.3	K	100	4		
MLP63	2.0		Ν	±70			
IVILEGO	_F65	20	K	100	5	F(±1%)	
			Ν	±70	5	J(±5%)	
			K	100	6		
			N	±70			
			16.0	K	100	7	
		16.9	N	±70			
		15.8	K	100	8		
		0.01	Ν	±70			
		14.9	K	100	9		
			Ν	±70			
		1/11	K	100	10		
		14.1	Ν	±70	10		

Style	Isolation voltage (V)	Category temperature range (°C)
RLP16		
RLP20		
RLP32		
RLP63	100	<i>–</i> 55~+155
MLP20		
MLP32		
MLP63		

3.2 Climatic category

55/155/56 Lower category temperature -55 °C Upper category temperature +155 °C

> Duration of the damp heat, steady state test 56days

3.3 Stability class

5% Limits for change of resistance:

-for long-term tests ±5% -for short-term tests ±1%

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3.4 Derating

The derated values of dissipation at temperature in excess of 70 °C shall be as indicated by the following curve.

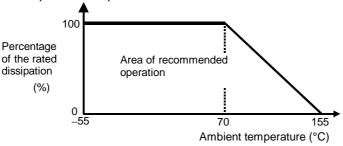


Figure-1 Derating curve

3.5 Rated voltage

d.c. or a.c. r.m.s. voltage calculated from the square root of the product of the rated resistance and the rated dissipation.

$$E = \sqrt{P \cdot R}$$

E: Rated voltage (V)

P: Rated dissipation (W)

R: Rated resistance (Ω)

3.6 Rated current

The rated current calculated from the square root of the quotient of the rated resistance and the rated dissipation.

$$I = \sqrt{P / R}$$

I: Rated current (A)

P: Rated dissipation (W)

R: Rated resistance (Ω)

The rated current shall be corresponding to rated voltage.

4. Packaging form

The standard packaging form shall be in accordance with Table-2.

Table-2

Symbol	Packaging form		Standard packaging quantity / units	Application
TP	Paper taping	8mm width, 4mm pitches	5,000 pcs.	RLP16, 20, 32, MLP20,32
TF	TE Embossed taping 12mm width, 4mr		4 000 pcs	RI P63 MI P63

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5. Dimensions

5.1 The resistor shall be of the design and physical dimensions in accordance with Figure-2 and Table-3.

5.1.1 RLP series

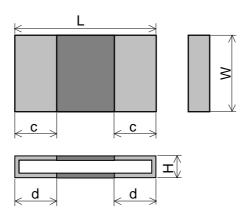
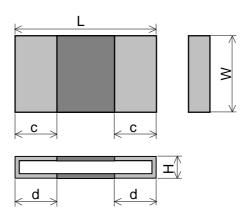


Figure-2

Table–3(1) Unit: mm

		iai	oie-3(1)			Unit: mm
Style	Rated resistance (m Ω)	L	W	Н	С	d
RLP16	5	0.45±0.10	0.6±0.1			
KLPIO	10	1.0±0.1	0.0±0.1	0.3±0.1	H C d 0.35±0.10 0.2±0.1 0.6±0.1 0.3±0.1 0.2±0.1 0.3±0.1 0.22±0.10 0.35±0.10 0.55±0.20 0.45±0.10 0.35±0.10 0.75±0.20 0.35±0.10 0.35±0.10 0.75±0.20 0.35±0.10 0.35±0.10 0.6±0.2 0.35±0.10 0.35±0.10 0.47±0.20 0.22±0.10 0.35±0.10 0.75±0.20 0.22±0.10 0.35±0.10 0.75±0.20 0.22±0.10 0.35±0.10 0.52±0.20 0.22±0.10 0.35±0.10 0.52±0.20 0.22±0.10 0.35±0.10 0.47±0.20 0.22±0.10 0.35±0.10 0.47±0.20 0.22±0.10 0.35±0.10 0.47±0.20 0.32±0.15 1.1±0.25 1.1±0.25 0.32±0.15 1.1±0.25 1.1±0.25 0.35±0.10 0.7±0.25 1.3±0.25 0.35±0.10 1.0±0.25 1.0±0.25 0.35±0.10 0.85±0.25 0.85±0.25 0.35±0.10 0.7±0.25 0.7±0.25 0.35±0.10 0.7±0.25 0.7±0.25 0.35±0.10 0.6±0.25 0.6±0.25 0.35±0.10 0.6±0.25 0.5±0.25 0.35±0.10 0.6±0.25 0.5±0.25 0.35±0.10 0.6±0.25 0.5±0.25 0.22±0.10 0.55±0.25 0.5±0.25 0.22±0.10 0.65±0.25 0.65±0.25 0.22±0.10 0.65±0.25 0.65±0.25	
	2			0.22±0.10	0.35±0.10	0.55±0.20
	3			0.45±0.10	0.35±0.10	0.75±0.20
	4			0.35±0.10	0.35±0.10	0.75±0.20
RLP20	5			0.35±0.10	0.35±0.10	0.6±0.2
	6	2.0±0.15	1.25±0.15	0.35±0.10	0.35±0.10	0.47±0.20
	7			0.22±0.10	0.35±0.10	0.75±0.20
	8			0.22±0.10	0.35±0.10	0.6±0.2
	9			0.22±0.10	0.35±0.10	0.52±0.20
	10			0.22±0.10	0.35±0.10	0.47±0.20
	1			0.32±0.15	1.1±0.25	1.1±0.25
	2			0.32±0.15	0.5±0.25	0.5±0.25
	3			0.35±0.10	0.7±0.25	1.3±0.25
	4			0.35±0.10	1.1±0.25	1.1±0.25
	5			0.35±0.10	1.0±0.25	1.0±0.25
	6			0.35±0.10	0.85±0.25	0.85±0.25
	7			0.35±0.10	0.7±0.25	0.7±0.25
RLP32	8	3.2±0.15	1.6±0.15	0.35±0.10	0.6±0.25	0.6±0.25
	9	0		0.3±0.1	0.75±0.25	0.75±0.25
	10			0.28±0.10	0.5±0.25	0.5±0.25
	11			0.28±0.10	0.5±0.25	0.5±0.25
	12			0.22±0.10	0.65±0.25	0.65±0.25
	13			0.22±0.10	0.65±0.25	0.65±0.25
	14			0.22±0.10	0.55±0.25	0.55±0.25
	15			0.22±0.10	0.5±0.25	0.5±0.25

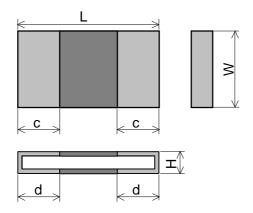
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		Tal	ole-3(2)			Unit: mm
Style	Rated resistance (m Ω)	L	W	Н	С	d
	1		3.2±0.25	0.38±0.15	2.2±0.25	2.2±0.25
	2			0.38±0.15	1.1±0.25	1.1±0.25
	3			0.45±0.15	2.2±0.25	2.2±0.25
	4			0.35±0.15	2.2±0.25	2.2±0.25
	5			0.34±0.15	1.95±0.25	1.95±0.25
	6			0.34±0.15	1.75±0.25	1.75±0.25
	7			0.35±0.15	1.4±0.25	1.4±0.25
RLP63	8	6.3±0.25	04.005	0.35±0.15	1.1±0.25	1.1±0.25
	9		3.1±0.25	0.35±0.15	0.8±0.25	0.8±0.25
	10]		0.23±0.15	1.75±0.25	1.75±0.25
	11]		0.23±0.15	1.75±0.25	1.75±0.25
	12			0.23±0.15	1.4±0.25	1.4±0.25
	13			0.23±0.15	1.3±0.25	1.3±0.25
	14			0.23±0.15	1.1±0.25	1.1±0.25
	15]		0.23+0.15	0.95+0.25	0.95+0.25

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5.1.2 MLP series



Table–3(3) Unit: mm

Style	Rated resistance (m Ω)	L	W	Н	С	d
	2			0.22±0.10	0.35±0.10	0.55±0.20
	3			0.45±0.10	0.35±0.10	0.75±0.20
	4		1.25±0.15	0.35±0.10	0.35±0.10	0.7±0.2
	5			0.35±0.10	0.35±0.10	0.6±0.2
MLP20	6	2.0±0.15		0.35±0.10	0.35±0.10	0.47±0.20
	7			0.22±0.10	0.35±0.10	0.75±0.20
	8			0.22±0.10	0.35±0.10	0.6±0.2
	9			0.22±0.10	0.35±0.10	0.52±0.20
	10			0.22±0.10	0.3±0.1	0.47±0.20
	1			0.32±0.15	1.1±0.25	1.1±0.25
	2			0.32±0.15	0.5±0.25	0.5±0.25
MLP32	3		1.6±0.15	0.35±0.10	0.7±0.25	1.3±0.25
	4			0.35±0.10	1.1±0.25	1.1±0.25
	5	3.2±0.15		0.35±0.10	1.0±0.25	1.0±0.25
	6			0.35±0.10	0.85±0.25	0.85±0.25
	7			0.35±0.10	0.7±0.25	0.7±0.25
	8			0.35±0.10	0.6±0.25	0.6±0.25
	9			0.3±0.1	0.75±0.25	0.75±0.25
	10			0.28±0.10	0.5±0.25	0.5±0.25
	0.5			0.58±0.15	2.2±0.25	2.2±0.25
	1.5			0.38±0.15	1.5±0.25	1.5±0.25
	2			0.58±0.15	2.2±0.25	2.2±0.25
	2.5			0.45±0.15	2.4±0.25	2.4±0.25
	3			0.45±0.15	2.2±0.25	2.2±0.25
MLP63	4	6.3±0.25	3.1±0.25	0.34±0.15	2.2±0.25	2.2±0.25
IVILPOS	5	0.3±0.23	3.1±0.25	0.51±0.15	1.1±0.25	1.1±0.25
	6			0.5±0.15	1.1±0.25	1.1±0.25
	7			0.5±0.15	0.6±0.25	0.6±0.25
	8			0.35±0.15	1.1±0.25	1.1±0.25
	9			0.35±0.15	0.8±0.25	0.8±0.25
	10			0.35±0.15	0.5±0.25	0.5±0.25



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5.2 Net weight (Reference)

Style	Rated resistance (mΩ)	Net weight (mg)
RLP16	5	2
RLP16	10	2
RLP20	2,4 to 10	3
KLP20	3	7
	1	12
	2	11
	3	11
	4	12
	5	11
	6	11
	7	11
RLP32	8	10
INCI 32	9	9
	10	9
	11	9
	12	8
	13	7
	14	7
	15	6
	1	50
	2	42
	3	57
	4	43
	5	43
	6	41
	7	42
RLP63	8	41
	9	40
	10	30
	11	30
	12	26
	13	26
	14	26
ĺ	15	26

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5.2 Net weight (Reference)

Style	Rated resistance (m Ω)	Net weight (mg)
MLP20	2,4 to 10	mΩ) Net weight (mg) 3 7 12 11 11 12 11 11 10 9 9 90 47 77 63 63 63 48 64 55 55 43 40 41
IVILP20	3	
	1	0 10 3 7 12 11 11 12 11 11 11 11 10 9 9 5 90 5 47 77 6 63 63 48 64 55 55 43 40
	2	11
	3	11
	4	12
MLP32	5	11
IVILI 32	6	11
	7	
	8	10
	9	
	10	
	0.5	90
	1.5	47
	2	77
	2.5	63
	3	63
MLP63	4	48
IVILEOS	5	64
	6	
	7	55
	8	43
	9	40
	10	41

6. Marking

The Rated resistance of RLP16 should not be marked standard.

6.1 RLP63, MLP63

The rated resistance shall be marked in 4 characters consisting of 3 figures and a letter and marked on over coat side.

(Example) "R010"
$$\rightarrow$$
 0.01 [Ω] \rightarrow 10 [m Ω]

"1L50"
$$\rightarrow$$
 0.0015 [Ω] \rightarrow 1.5 [m Ω]

6.2 RLP20, 32, MLP20, 32

The rated resistance shall be marked in combination of two figures and underlines and marked on over coat side.

$$(\text{Example}) \quad \text{``}\underline{05}\text{''} \rightarrow 0.005 \ [\Omega] \rightarrow 5 \ [\text{m}\Omega]$$

"
$$\underline{10}$$
" \rightarrow 0.01 [Ω] \rightarrow 10 [m Ω]

Title: METAL-PLATE CHIP RESISTOR; LOW OHM

RLP16, 20, 32, 63, MLP20,32, 63 Page: 13/24

7. Performance

7.1 The standard condition for tests shall be in accordance with Sub-clause 4.2, JIS C 5201–1: 2011.

7.2 The performance shall be satisfied in Table-4.

Table-4(1)

Table- 4(1)							
No.	Test items	C	condition of test (JIS C 52	201–1)		Performance requirements
1	Visual examination	Sub-clause	e 4.4.1				As in 4.4.1
		Checked b	y visual examina	ation.			The marking shall be legible, as
							checked by visual examination.
2	Dimension	Sub-clause	e 4.4.2				As specified in Table-3 of this
							specification.
	Resistance		Resistance value shall be measured by mounting he substrate of the following condition.				As in 4.5.2
		the substra	te of the followin	ig condit	ion.		The resistance value shall
			$b \rightarrow a$				correspond with the rated
		Current terminal		rent ninal			resistance taking into account the
		terminai	Tem lem		:Copper	clad	specified tolerance.
		Vo	ltage terminal		:Solder		
					Unit	t:mm	
		0.1	Resistance				
		Style	value(m Ω)	а	b	С	
		RLP16	5	0.6	0.9	0.9	
		INLF IU	10	1.0	0.6	0.9	
		RLP20	2,3	0.5	1.1	1.36	
		1121 20	4 to 10	0.8	0.95	1.00	
			1	1.0	1.45		
			2	2.1	0.9		
		RLP32	3	0.8	1.55	1.7	
			4	1.0	1.45		
			5 and 6	1.4	1.25		
			7 to 15	2.1 1.5	0.9 3.0	4.0	
			2			4.0	
		RLP63	3, 4	4.0	1.8		
		KLF03	<u> </u>	1.8 2.4	2.9 2.6	3.5	
			6 to 15	4.0	1.8		
			2,3	0.5	1.1		
		MLP20	4 to 10	0.8	0.95	1.36	
			1	1.0	1.45		
			2	2.1	0.9	1	
		MI DOO	3	0.8	1.55	4 -	
		MLP32	4	1.0	1.45	1.7	
			5 and 6	1.4	1.25	1	
			7 to 10	2.1	0.9		
		MLP63	0.5,2 to 4	1.8	2.9	3.5	
		1.5, 5 to 10 4.0 1.8					
		Thickness of copper clad: 0.035mm					
		4-Terminal method					
		Measurement current: 1(A) Note: The measuring apparatus corresponding to				dina ta	
			•			-	
		CORPOR	ohm Mater (1A)	UI AA-	1020 101	ADEX	
<u></u>		CONFUR	ALION.				

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METAL-PLATE CHIP RESISTOR; LOW OHM

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Table-4(2)

No	Test items	Condition of test (JIS C 5201–1)	Performance requirements
3	Voltage proof	Sub-clause 4.7	No breakdown or flash over
3	Voltage proof	Sub-clause 4.7 Method: 4.6.1.4(See Figure–5)	INO DIEdROOWITOI IIdSITOVEI
		Test voltage: Alternating voltage with a peak value	
		of 1.42 times the insulation voltage. Duration: 60 s±5 s	
		Insulation resistance	R≥1 GΩ
			N2 1 G52
		Test voltage: Insulation voltage Duration: 1 min.	
4	Solderability	Sub-clause 4.17	As in 4.17.4.5
4	Solderability		The terminations shall be covered
		Without aging	with a smooth and bright solder
		Flux: The resistors shall be immersed in a	coating.
		non–activated soldering flux for 2 s.	Coating.
		Bath temperature: 235 °C±5 °C	
_	NA C	Immersion time: 2 s±0.5 s	
5	Mounting	Sub-clause 4.31	
		Substrate material: Epoxide woven glass	
	O codo o d	Test substrate: RLP16: Figure–3–1	
	Overload (in the array water)	RLP20, MLP20 Figure-3-2	
	(in the mounted state)	RLP32 MLP32 Figure-3-3	
		RLP63, MLP63 Figure-3-4	
		Sub-clause 4.13	
		The applied voltage shall be 2.5 times the rated	
		voltage or the current corresponding to.	
		Duration: 2 s	No visible domage
		Visual examination	No visible damage ∆R ≤ ±1%
	Solvent resistance of the	Resistance	1
	marking	Sub-clause 4.30	Legible marking
	marking	Solvent: 2-propanol	
		Solvent temperature: 23 °C±5 °C	
		Method 1	
		Rubbing material: cotton wool	
		Without recovery	
6	Mounting	Sub-clause 4.31	
		Substrate material: Epoxide woven glass	
		Test substrate: Figure-4	
	Bound strength of the end	Sub-clause 4.33	
	face plating	Bent value: 3mm(RLP16, 20, 32, MLP20, 32)	
		1 mm(RLP63, MLP63)	
		Resistance	ΔR ≤ ±1%
	Final measurements	Sub-clause 4.33.6	
		Visual examination	No visible damage

RLP16, 20, 32, 63, MLP20,32, 63 15/24 Page:

Table-4(3)

	Iable—4(3)					
No	Test item		Condition of test (JIS C 5201–1)	Performance requirements		
7	Resistance to heat	soldering	Sub-clause 4.18 (JEITA RC-2144 2.3.2) Substrate material: Epoxide woven glass Test substrate: Figure-3-1 T ₁ :Pre-heat minimum temp.:150±5 °C T ₂ :Pre-heat maximum temp.:180±5 °C T ₃ :Soldering temp.:220 °C T ₄ :Peak temp.:250 °C t ₁ :Pre-heat duration:120±5 s t ₂ :Soldering duration:60 to 90 s t ₃ :Peak duration(T ₄ -5°C):20 to 40 s Pre-reflow soldering: 1 time (Initial measurements) Reflow soldering: 3 times T ₄ T ₃ T ₂ T ₁			
	Component resistance	solvent	Visual examination Resistance Sub-clause 4.29 Solvent: 2-propanol Solvent temperature: 23 °C±5 °C Method 2 Recovery: 48 h Visual examination Resistance	No visible damage $\Delta R \leq \pm 1\%$ No visible damage $\Delta R \leq \pm 1\%$		
8	Mounting Adhesion		Sub-clause 4.31 Substrate material: Epoxide woven glass Test substrate: Figure–3–1 Sub-clause 4.32 Force: 5 N Duration: 10 s±1 s			
	Rapid change ter	mperature	Visual examination Sub-clause 4.19 Lower category temperature:-55 °C Upper category temperature:+155 °C Duration of exposure at each temperature: 30 min. Number of cycles: 5 cycles. Visual examination Resistance	No visible damage $\label{eq:local_problem} \begin{tabular}{ll} No visible damage \\ $\Delta R \le \pm 1\% \end{tabular}$		

METAL-PLATE CHIP RESISTOR; LOW OHM

RLP16, 20, 32, 63, MLP20,32, 63 16/24 Page:

Table-4(4)

	Iable-4(4)					
No	Test items	Condition of test (JIS C 5201–1)	Performance requirements			
9	Climatic sequence	Sub-clause 4.23				
	-Dry heat	Sub-clause 4.23.2				
		Test temperature: +155 °C				
		Duration: 16 h				
	-Damp heat, cycle	Sub-clause 4.23.3				
	(12+12hour cycle)	Test method: 2				
	First cycle	Test temperature: 55 °C				
		[Severity(2)]				
	-Cold	Sub-clause 4.23.4				
		Test temperature –55 °C				
		Duration: 2h				
	-Damp heat, cycle	Sub-clause 4.23.6				
	(12+12hour cycle)	Test method: 2				
	Remaining cycle	Test temperature: 55 °C				
		[Severity (2)]				
		Number of cycles: 5 cycles				
	-D.C. load	Sub-clause 4.23.7				
		The applied current shall be the rated current.				
		Duration: 1 min.	No visible damage			
		Visual examination	ΔR≤±5%			
40	NA	Resistance				
10	Mounting	Sub-clause 4.31				
		Substrate material: Epoxide woven glass				
		Test substrate: RLP16: Figure-3-1				
		RLP20, MLP20 Figure-3-2				
		RLP32 MLP32 Figure-3-3				
	Endurance at 70 °C	RLP63, MLP63 Figure–3–4				
	Endarance at 70°C	Sub-clause 4.25.1				
		Ambient temperature: 70 °C±2 °C				
		Duration: 1000 h				
		The current shall be applied in cycles of 1.5 h on and 0.5 h.				
		The applied current shall be the rated current Examination at 48 h, 500 h and				
		1000 h:				
		Visual examination	No visible damage			
		Resistance	ΔR ≤ ±5 %			
11	Mounting	Sub-clause 4.31				
		Substrate material: Epoxide woven glass				
		Test substrate: Figure–3–1				
	Variation of resistance with	Sub-clause 4.8	As in Table–1			
	temperature	+20 °C /+155 °C				
	•	120 07 1100 0				

KAMAYA OHM

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METAL-PLATE CHIP RESISTOR; LOW OHM

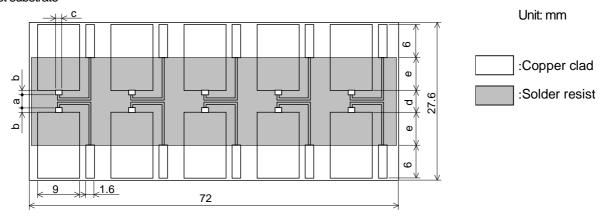
RLP16, 20, 32, 63, MLP20,32, 63 17/24 Page:

Table-4(5)

No	Test items	Condition of test (JIS C 5201–1)	Performance requirements
12	Mounting	Sub-clause 4.31 Substrate material: Epoxide woven glass Test substrate: Figure-3-1	
	Damp heat, steady state	Sub-clause 4.24 Ambient temperature: 40 °C±2 °C Relative humidity: 93 ½ % Without current applied. Visual examination Resistance	No visible damage Legible marking ΔR ≤ ±5%
13	Dimensions (detail)	Sub-clause 4.4.3	As in Table–4
	Mounting Endurance at upper	Sub-clause 4.31 Substrate material: Epoxide woven glass Test substrate: Figure-3-1 Sub-clause 4.25.3	
	category temperature	Ambient temperature:155 °C±2 °C Duration: 1000 h Examination at 48 h, 500 h and 1000 h: Visual examination Resistance	No visible damage ΔR ≤ ±5%

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8. Test substrate



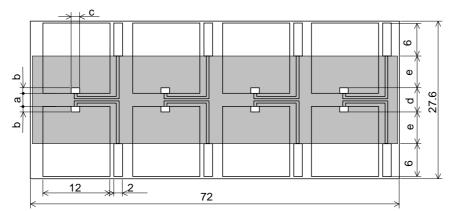
Style	Rated resistance (m Ω)	а	b	С	d	е
	5	0.6	0.9	0.0	0.0	0.0
RLP16	10	1.0	0.6	0.9	2.2	6.2
RLP20	2,3	0.5	1.1	1.36	2.7	5.95
KLP20	4 to 10	8.0	0.95	1.30	2.1	5.95
	1	1.0	1.45			
RLP32	2	2.1	0.9			
	3	8.0	1.55	17	3.0	5 35
INLF 32	4	1.0 1.45 1.4 1.25 2.1 0.9 1.5 3.05				
	5 and 6	1.4	1.25			
	7 to 15	2.1	0.9			
RLP63	1	1.5	3.05			
	2	4.0	1.8			
	3, 4	1.8	2.9	3.5	7.6	3.5
	5	2.4	2.6			
	6 to 15	4.0	1.8			
MI DOO	2,3	0.5	1.1	1 26	27	E 0E
MLP20	4 to 10	8.0	0.95	1.36	7.6 3.5 2.7 5.95	5.95
	1	1.0	1.45			
	2	2.1	0.9			
MLP32	3	0.8	1.55	1.7	3.9	5.35
WILP32	4	1.0	1.45	1.7	3.9	5.35
	5 and 6	1.4	1.25			
	7 to 10	2.1	0.9			
MI Dea	0.5, 2 to 4	1.8	2.9	2.5	7.6	2.5
MLP63	1.5, 5 to 10	4.0	1.8	3.5	7.6	3.5

Figure-3-1 RLP16, 20, 32, 63, MLP20,32, 63 TEST SUBSTRATE

Remark: Material: Epoxy resin based as glass fabric(Specified in JIS C 6484).

Thickness: 1.6mm Thickness of copper clad: 0.035mm

RLP16, 20, 32, 63, MLP20,32, 63 Page: 19/24



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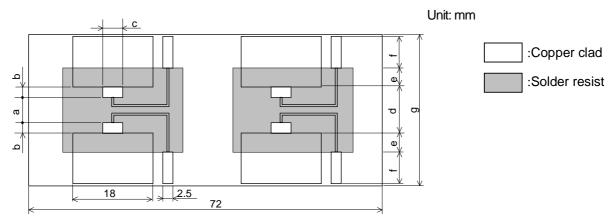
Unit: mm

Style	Rated resistance (m Ω)	а	b	С	d	е
RLP20	2,3	0.5	1.1			
KLF20	4 to 10	8.0	0.95	1.36	2.7	5.95
MI DOO	2,3	0.5	1.1	1.30	2.7	5.95
MLP20	4 to 10	0.8	0.95			

Figure-3-2 RLP20, MLP20 TEST SUBSTRATE

Remark: Material: Epoxy resin based as glass fabric(Specified in JIS C 6484).

Thickness: 1.6mm Thickness of copper clad: 0.035mm



Style	Rated resistance (m Ω)	а	b	С	d	е	f	g
RLP32	1	1.0	1.45	1.7	3.9	5.35	11.68	39
	2	2.1	0.9				6.0	27.6
	3	0.8	1.55				0.0	27.0
	4	1.0	1.45				11.68	39
	5 and 6	1.4	1.25				6.0	27.6
	7 to 15	2.1	0.9				0.0	27.0
MLP32	1	1.0	1.45	17	1.7 3.9	3.9 5.35	11.68	39
	2	2.1	0.9				6.0	27.6
	3	0.8	1.55				0.0	27.0
	4	1.0	1.45	1.7			11.68	39
	5 and 6	1.4	1.25				6.0	27.6
	7 to 10	2.1	0.9				0.0	21.0

Figure-3-3 RLP32, MLP32 TEST SUBSTRATE

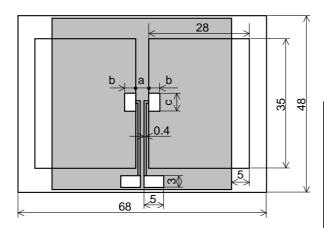
Remark: Material: Epoxy resin based as glass fabric(Specified in JIS C 6484).

Thickness: 1.6mm Thickness of copper clad: 0.07mm

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RLP16, 20, 32, 63, MLP20,32, 63 Page: 20/24



Unit: mm :Copper clad :Solder resist Style Rated resistance (mΩ) a b b 1 2.0 3.0 2 4.0 1.8 RLP63 3, 4 1.8 2.9

С 4.0 RLP63 3.5 2.4 2.6 5 1.8 6 to 15 4.0 0.5, 2 to 41.8 2.9 MLP63 3.5 1.5, 5 to 10 1.8 4.0

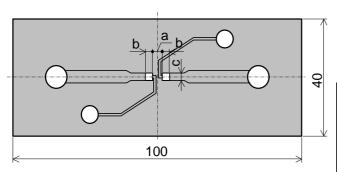
Figure-3-4 RLP63, MLP63 TEST SUBSTRATE

Remark: Material: Epoxy resin based as glass fabric(Specified in JIS C 6484).

Thickness: 1.6mm Thickness of copper clad: 0.07mm

Remark: In the case of connection by connector, the connecting terminals are gold plated.

However, the plating is not necessary when the connection is made by soldering.



Unit: mm :Copper clad :Solder resist

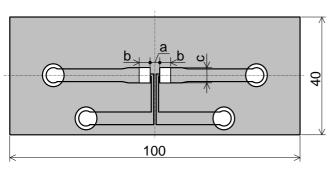
Style	Rated resistance (m Ω)	а	b	С	
DI D16	5	0.6	0.9	0.0	
RLP16	10	1.0	0.6	0.9	
RLP20	2,3	0.5	1.1	1.36	
KLP20	4 to 10	0.8	0.95	1.50	
	1	1.0	1.45		
	2	2.1	0.9		
DI Doo	3	8.0	1.55	1.7	
RLP32	4	1.0	1.45		
	5 and 6	1.4	1.25		
	7 to 15	2.1	0.9		
MI DOO	2,3	0.5	1.1	1.36	
MLP20	4 to 10	8.0	0.95	1.30	
MLP32	1	1.0	1.45		
	2	2.1	0.9		
	3	0.8	1.55	17	
	4	1.0	1.45	1.7	
	5 and 6	1.4	1.25		
	7 to 10	2.1	0.9		

RLP16, 20, 32, MLP20 32 BOUND STRENGTH OF THE END FACE PLATING TEST SUBSTRATE

Drawing No: RLP-K-HTS-0001

Title: METAL-PLATE CHIP RESISTOR; LOW OHM

RLP16, 20, 32, 63, MLP20,32, 63 Page: 21/24



Unit: mm				
	:Copper clad			
	:Solder resist			

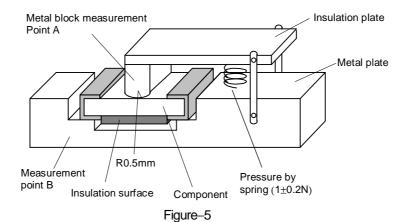
Style	Rated resistance (m Ω)	а	b	С	
	1	1.5	3.05	4.0	
	2	4.0	1.8		
RLP63	3, 4	1.8	2.9	3.5	
	5	2.4	2.6	ა.ა	
	6 to 15	4.0	1.8		
MLP63	0.5, 2 to 4	1.8	2.9	3.5	
IVILPOS	1.5, 5 to 10	4.0	1.8	5.5	

RLP 63, MLP63 BOUND STRENGTH OF THE END FACE PLATING TEST SUBSTRATE

Figure 4

Remark. Material: Epoxy resin based as glass fabric(Specified in JIS C 6484).

Thickness: 1.6mm Thickness of copper clad: 0.035mm



Product specification contained in this specification are subject to change at any time without notice.

Title: METAL-PLATE CHIP RESISTOR; LOW OHM

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9. Taping

- 9.1 Applicable documents JIS C 0806-3: 2014, EIAJ ET-7200C: 2010
- 9.2 Taping dimensions
- 9.2.1 Paper taping (8mm width, 4mm pitches)

Taping dimensions shall be in accordance with Figure-6 and Table-5.

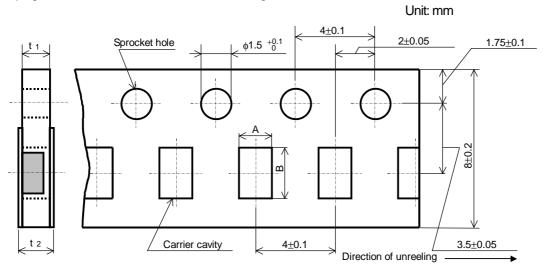


Figure-6

	Unit: mm			
Style	Α	В	t 1	t 2
RLP16	1.15±0.15	1.9 ± 0.2	0.6±0.1	0.8max.
RLP20	1.65±0.15	2.5±0.2	0.6±0.1	0.8max.
MLP20	1.03±0.15	2.5±0.2	0.6±0.1	U.OITIAX.
RLP32	2.00±0.15	3.6±0.2	0.6±0.1	0.8max.
MLP32	2.00±0.13	3.0±0.2	0.0±0.1	U.OITIAX.

9.2.2 Embossed taping (12mm width, 4mm pitches)

Taping dimensions shall be in accordance with Figure-7 and Table-6.

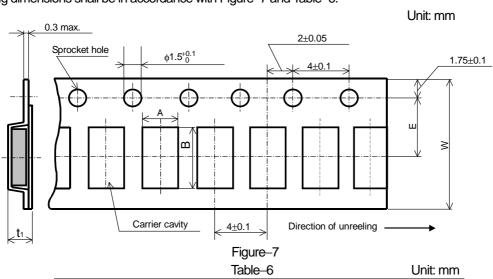


Table-6					Unit: mm
Style	Α	В	W	Е	t 1
RLP63	3.6±0.2	6.9+0.2	12.0±0.3	5.5±0.05	1.1±0.15
MLP63	3.0±0.2	0.9±0.2	12.0±0.3	5.5±0.05	1.1±0.15

Title: METAL-PLATE CHIP RESISTOR; LOW OHM

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- 1). The cover tapes shall not cover the sprocket holes.
- 2). Tapes in adjacent layers shall not stick together in the packing.
- 3). Components shall not stick to the carrier tape or to the cover tape.
- 4). Pitch tolerance over any 10 pitches ±0.2mm.
- 5). The peel strength of the top cover tape shall be with in 0.1N to 0.5N on the test method as shown in the following RLP16, 20, 32, MLP20, 32: Figure–8, RLP63, MLP63: Figure–9.
- 6). When the tape is bent with the minimum radius for (RLP16, 20, 32, MLP20, 32: 25mm, RLP63, MLP63: 30mm) the tape shall not be damaged and the components shall maintain their position and orientation in the tape.
- 7). In no case shall there be two or more consecutive components missing.

 The maximum number of missing components shall be one or 0.1%, whichever is greater.

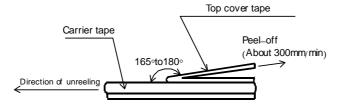


Figure-8

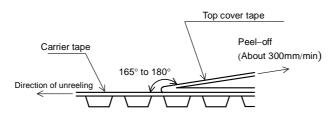


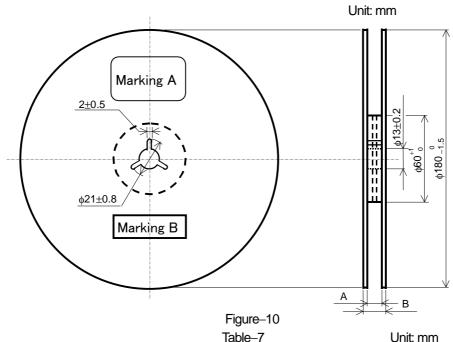
Figure-9

METAL-PLATE CHIP RESISTOR; LOW OHM

RLP16, 20, 32, 63, MLP20,32, 63 Page: 24/24

9.3 Reel dimension

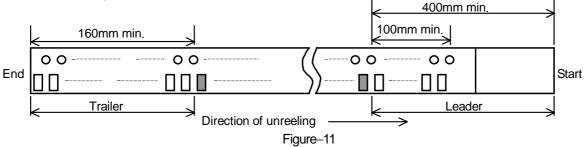
Reel dimensions shall be in accordance with the following Figure-10 and Table-7. Plastic reel (Based on EIAJ ET-7200C)



		Offic Hilli	
Style	A	В	Note
RLP16, 20, 32, MLP20,	32 9 +1.0	11.4±1.0	Injection molding
17LF 10, 20, 32, WILF 20,	32 9 ₀	13±1.0	Vacuum forming
RLP63, MLP63	13 ^{+1.0}	17±1.0	Vacuum forming

Note: Marking label shall be marked on a place of Marking A or two place of Marking A and B.

9.4 Leader and trailer tape.



10. Marking on package

The label of a minimum package shall be legibly marked with follows.

10.1 Marking A

(1) Classification

(Style, Temperature coefficient of resistance, Rated resistance, Tolerance on rated resistance, Packaging form)

(2) Lot number (3) Quantity (4) Manufacturer's name or trade mark (5) Others

10.2 Marking B (KAMAYA Control label)